UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/673,479	10/16/2000	Nobuaki Hashimoto	107280	6925

25944 7590 07/30/2004

OLIFF & BERRIDGE, PLC
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER	
GRAYBILL, DAVID E	
ART UNIT	PAPER NUMBER
2827	

DATE MAILED: 07/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/673,479	HASHIMOTO, NOBUAKI	
	Examiner	Art Unit	
	David E Graybill	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-8,10-16,19-22,24,27 and 29-45* is/are pending in the application.

4a) Of the above claim(s) *1,4-8,10-14,21,22,24 and 27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15,16,19,20 and 29-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 October 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Applicant's election with traverse of Group II, claims 15, 16, 19, 20 and 29-45, in the reply filed on 5-12-4 is acknowledged. The traversal is on the ground(s) that, "search and examination of the entire application could be made without serious burden." This is not found persuasive because the reasons for insisting on restriction as stated in MPEP 808 have been clearly met.

The requirement is still deemed proper and is therefore made FINAL. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, every feature of claims 15, 16, 19, 20 and 29-45 must be shown or the features canceled from the claims. In particular, the claimed features, such as the particular binder structures and compositions, are not shown in combination with the feature of the binder electrically connecting the chip and the pattern.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

To determine adequacy of written description MPEP 2163IIA2(a) (redacted) instructs:

> (i) For Each Claim Drawn to a Single Embodiment Or Species:
> (A) Determine whether the application describes an actual reduction to practice of the claimed invention.
> (B) If the application does not describe an actual reduction to practice, determine whether the invention is complete as evidenced by a reduction to drawings or structural chemical formulas that

are sufficiently detailed to show that applicant was in possession of the claimed invention as a whole.
(C) If the application does not describe an actual reduction to practice or reduction to drawings or structural chemical formula as discussed above, determine whether the invention has been set forth in terms of distinguishing identifying characteristics as evidenced by other descriptions of the invention that are sufficiently detailed to show that applicant was in possession of the claimed invention.
(1) Determine whether the application as filed describes the complete structure (or acts of a process) of the claimed invention as a whole.
(2) If the application as filed does not disclose the complete structure (or acts of a process) of the claimed invention as a whole, determine whether the specification discloses other relevant identifying characteristics sufficient to describe the claimed invention in such full, clear, concise, and exact terms that a skilled artisan would recognize applicant was in possession of the claimed invention. Any claim to a species that does not meet the test described under at least one of (a), (b), or (c) must be rejected as lacking adequate written description under 35 U.S.C. 112, para. 1.
ii) For each claim drawn to a genus:
The written description requirement for a claimed genus may be satisfied through sufficient description of a representative number of species by actual reduction to practice (see i)(A), above), reduction to drawings (see i)(B), above), or by disclosure of relevant, identifying characteristics, i.e., structure or other physical and/or chemical properties, by functional characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics, sufficient to show the applicant was in possession of the claimed genus (see i)(C), above).

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 15, 16, 19, 20, 31, 32, 35-38 and 42-45 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The undescribed subject matter of the claimed invention is the claimed genera.

The instant application does not describe sufficient description of a representative number of species by actual reduction to practice, reduction to drawings, or by disclosure of relevant, identifying characteristics, i.e., structure or other physical and/or chemical properties, by functional characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics, sufficient to show the applicant was in possession of the claimed genera.

Claims 15, 16, 19, 20, 31, 32, 35-38 and 42-45 are rejected under 35 U.S.C. 112, first paragraph, because the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

Specifically, the specification does not reasonably provide enablement for the genera of claims 15, 16, 19, 20, 31, 32, 35-38 and 42-45. The claimed genera are not enabled because the binder is claimed in terms of its properties and functions, and there is no disclosed or otherwise known correlation or relationship between the properties and functions of the binder genera and the binder composition or structure. To further clarify, there is no disclosure that the claimed properties and functions define a particular binder composition species or genus. In addition, the invention involves

unpredictable chemical reactions, and absent a statement applicable to the genera as a whole, it is indeterminable from the disclosure of the particular species what other species will work; hence, it is indeterminable what other species are members of the genera. As a result, a person skilled in the art could not make the binder genera as a whole without undue experimentation. Chemical reactivity is a most unpredictable and empirical art and it is well settled that the requirement that the claims be commensurate in scope with the enabling disclosure is particularly stringent in this area of technology. In re Doumani 126 USPQ 408, In re Grant 134 USPQ 248, In re Fisher 166 USPQ 18, Mobil Oil Corporation v. W. R. Grace and Company 180 USPQ 418, In re Slocombe 184 USPQ 740, In re Mercier 185 USPQ 774, Corona Cord Tire Company v. Dovan Chemical Corporation 192 CD 255, See In re Hawkins 174 USPQ 157 (pg. 163) reasoning is sufficient, evidence is not required.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 30, 32-35 and 38-43 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the

relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The undescribed subject matter includes the embodiments comprising the claim 15 limitation of a coefficient of thermal expansion of the first layer being smaller than a coefficient of thermal expansion of the second layer in combination with the limitations of claims 30 and 32-35. The undescribed subject matter also includes the embodiments comprising the claim 36 limitation wherein a modulus of elasticity of the second layer is smaller than a modulus of elasticity of the first layer in combination with the limitations of claims 38-43.

Claims 33 and 34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The unenabled subject matter includes the embodiments comprising the claim 15 limitation of a coefficient of thermal expansion of the first layer being smaller than a coefficient of thermal expansion of the second layer in combination with the limitations of claims 34 and 35. In particular, the claim 15 limitation is incompatible with the claims 34 and 35 limitations,

because, as applicant originally disclosed, a greater silica component ratio in a layer results in a smaller coefficient of thermal expansion.

In the rejections infra, generally, reference labels are recited only for the first recitation of identical claim elements.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15, 20, 29, 30, 36, 38-41 and 45 are rejected under 35 U.S.C. 102(e) as being anticipated by Suzuki (6049038).

At column 2, lines 14-34; column 3 lines 6-18; column 4, lines 12-61; and column 5, line 57 to column 6, line 24, Suzuki discloses the following:

A semiconductor device comprising: a semiconductor chip 2; a substrate 1 on which a interconnecting pattern "mounting pad" is formed; and a binder 3 electrically connecting the semiconductor chip and the interconnecting pattern, the binder including: a "first" layer; and a "second" layer disposed closer to the substrate than the first layer, a coefficient of thermal expansion of the first layer being smaller than a coefficient of

thermal expansion of the second layer; wherein a silica insulating filler 4 is mixed only in the first layer; wherein the second layer includes an epoxy resin; and electronic equipment 2 comprising the semiconductor device.

A semiconductor device comprising: a semiconductor chip; a substrate on which a interconnecting pattern is formed; and a binder electrically connecting the semiconductor chip and the interconnecting pattern, the binder including a first layer; and a second layer disposed closer to the substrate than the first layer, wherein a modulus of elasticity of the second layer is inherently smaller than a modulus of elasticity of the first layer; wherein a coefficient of thermal expansion of the first layer is smaller than a coefficient of thermal expansion of the second layer; wherein a silica insulating filler is mixed only in the first resin; wherein a silica insulating filler is mixed in the first layer and the second layer, and a component ratio of the silica insulating filler in the first layer is greater than a component ratio of the silica insulating filler in the second layer; wherein the second resin includes an epoxy resin; and electronic equipment comprising the semiconductor device.

To further clarify the disclosure wherein a modulus of elasticity of the second layer is inherently smaller than a modulus of elasticity of the first layer, as cited, Suzuki discloses a coefficient of thermal expansion of the first layer being smaller than a coefficient of thermal expansion of the second

layer, and, as evidenced by Yamada (5959363) at column 3, lines 54-63, filler induced coefficient of thermal expansion and modulus of elasticity of a resin are inherently indirectly correlated.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 15, 16, 20, 30-32, 35-37, 41, 42 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Tsukagoshi (5120665) and Suzuki (6049038).

At column 5, line 56 to column 6, line 41; column 7, lines 8-11; column 8, line 1 to column 9, line 9; column 11, lines 46-49; column 11, line 60 to column 13, line 30; column 14, lines 24-65; column 17, lines 11-21; and column 20, line 51 to column 21, line 33, Tsukagoshi discloses the following:

A semiconductor device comprising: a semiconductor chip 11; a substrate 14 on which a interconnecting pattern 15 is formed; and a binder electrically connecting the semiconductor chip and the interconnecting pattern, the binder including: a first layer 16; and a second layer 18 disposed closer to the substrate than the first layer; wherein the binder is an anisotropic conductive film; wherein the second layer includes an epoxy resin; wherein conductive particles 3 are dispersed only in the second layer; wherein the conductive particles are dispersed only in the second layer: and wherein the second layer is thinner than the first layer, and the second layer has higher viscosity than the first layer when melted; wherein a molecular weight of the second layer is inherently greater than a molecular weight of the first layer; and electronic equipment 11 comprising the semiconductor device.

A semiconductor device comprising: a semiconductor chip; a substrate on which a interconnecting pattern is formed; and a binder electrically connecting the semiconductor chip and the interconnecting pattern, the

binder including a first layer; and a second layer disposed closer to the substrate than the first layer; wherein the binder is an anisotropic conductive film; wherein the second resin includes an epoxy resin; wherein conductive particles are dispersed only in the second layer; and wherein the second layer is thinner than the first layer, and the second layer has higher viscosity than the first layer when melted; and electronic equipment comprising the semiconductor device.

To further clarify the disclosure that a molecular weight of the second layer is inherently greater than a molecular weight of the first layer, the molecular weight of the second layer Pb 9 is inherently greater than the molecular weight of the first layer resin.

However, Tsukagoshi does not appear to explicitly disclose a coefficient of thermal expansion of the first layer being smaller than a coefficient of thermal expansion of the second layer; wherein a silica insulating filler 4 is mixed only in the first layer; wherein a silica insulating filler is mixed in the first layer and the second layer, and a component ratio of the silica insulating filler in the first layer is greater than a component ratio of the silica insulating filler in the second layer.

Nonetheless, as cited supra, Suzuki discloses a coefficient of thermal expansion of the "first" layer being smaller than a coefficient of thermal expansion of the "second" layer; wherein a silica insulating filler 4 is mixed

only in the first layer; wherein a silica insulating filler is mixed in the first layer and the second layer, and a component ratio of the silica insulating filler in the first layer is greater than a component ratio of the silica insulating filler in the second layer. Furthermore, it would have been obvious to combine this product with the product of Tsukagoshi because it would improve the product reliability.

Although Tsukagoshi does not appear to explicitly disclose wherein a modulus of elasticity of the second layer is smaller than a modulus of elasticity of the first layer, the combination of Suzuki and Tsukagoshi discloses a coefficient of thermal expansion of the first layer being smaller than a coefficient of thermal expansion of the second layer, and, as evidenced by Yamada as cited supra, filler induced coefficient of thermal expansion and modulus of elasticity of a resin are inherently indirectly correlated.

Claims 19 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki or Tsukagoshi as applied to claims 15 and 36, and further in combination with Nakamura (6344696).

Neither Suzuki nor Tsukagoshi appear to explicitly disclose a circuit board on which the semiconductor device is mounted.

Notwithstanding, at column 1, lines 13-36, Nakamura discloses a circuit board "mother board" on which a semiconductor device 2, 14 is

mounted. In addition, it would have been obvious to provide the circuit board of Nakamura on which the device of Suzuki or Tsukagoshi is mounted because it would facilitate external electrical connection of the device.

Applicant's remarks filed on 1-30-4 have been fully considered and are adequately addressed supra.

The art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions similar to the instant invention.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to Group 2800 Head SAE Linda Hodge-Taylor whose telephone number is 571-272-1585.

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is (703) 872-9306.

David E. Graybill
Primary Examiner
Art Unit 2827

D.G.
23-Jul-04